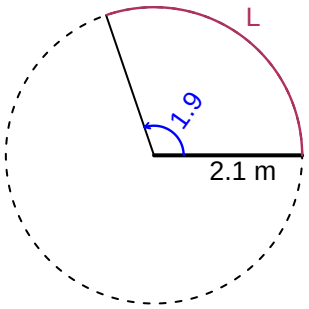
Name: Date:

Trig Final (SLTN v668)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 2.1 meters. The angle measure is 1.9 radians. How long is the arc in meters?

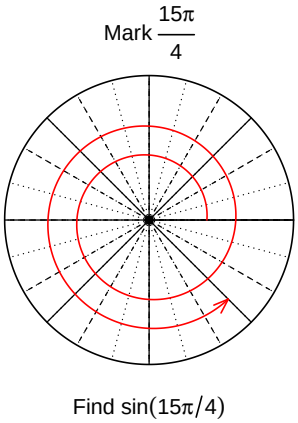


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

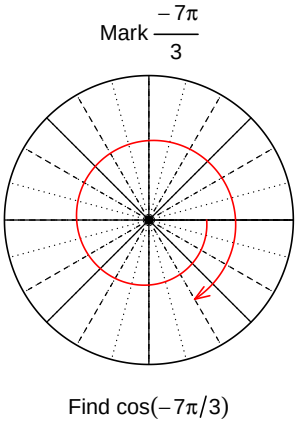
$L = 3.99$ meters.

Question 2

Consider angles $\frac{15\pi}{4}$ and $\frac{-7\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{15\pi}{4}\right)$ and $\cos\left(\frac{-7\pi}{3}\right)$ by using a unit circle (provided separately).



Find $\sin(15\pi/4)$



Find $\cos(-7\pi/3)$

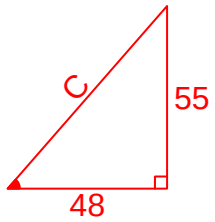
$\sin(15\pi/4) = \frac{-\sqrt{2}}{2}$

$\cos(-7\pi/3) = \frac{1}{2}$

Question 3

If $\tan(\theta) = \frac{-55}{48}$, and θ is in quadrant IV, determine an exact value for $\sin(\theta)$.

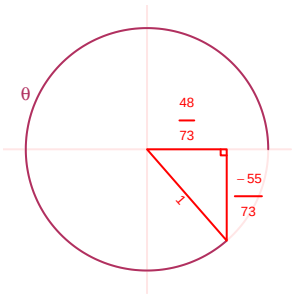
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$48^2 + 55^2 = C^2$$
$$C = \sqrt{48^2 + 55^2}$$
$$C = 73$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\sin(\theta) = \frac{-55}{73}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 5.09 meters, a midline at $y = -2.07$ meters, and a frequency of 7.13 Hz. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 5.09\cos(2\pi 7.13t) - 2.07$$

or

$$y = 5.09\cos(14.26\pi t) - 2.07$$

or

$$y = 5.09\cos(44.8t) - 2.07$$